

Remarks

I. Status of the Application and Claims

At the time that the present Office Action was mailed, the claims pending in the application were claims 61-80. No claims have been cancelled or added herein.

II. The Amendments

Claim 61 was amended to indicate that the laser weldability of plastic molded bodies or plastic semifinished products is due to the presence of laser absorbing particles. Support for this amendment may be found in claim 1 as originally filed.

Claim 76 was amended to indicate that mixing takes place under conditions of shear sufficient to prevent the agglomeration or aggregation of laser-absorbing particles into larger units. Support for this amendment may be found on page 12 of the application, first full paragraph.

Applicants do not believe that the amendments made herein add new matter to the application and their entry is respectfully requested.

The Rejections

I. Rejection of Claims Under 35 USC §112, Second Paragraph

On page 2 of the Office Action claims 61-80 are rejected under 35 USC §112, second paragraph based upon the allegations that the terms “high transparency” and “high shear” in are indefinite.

Applicants respectfully traverse this rejection. The term “high transparency” is defined on page 6, 2nd full paragraph, as follows:

High-transparency plastic materials are to be understood as those which have a transmission greater than 85% and particularly greater than 90% and a haze less than 3%, preferably less than 2%, and particularly less than 1% at a material thickness of 2 mm. Transmission and haze are determined in accordance with ASTM D 1003.

According to the definition above, a high transparency material is one that has a transmission of greater than 85% and a haze of less than 3% at a material thickness of 2 mm as determined using the ASTM standard test indicated. Thus, the term is unambiguously defined.

The term “high shear” has been removed from claim 76. Instead, this claim now refers to shear that prevents the agglomeration or aggregation of particles into larger units. Applicants submit that, as a result of this amendment, the claims now provide a definition for the amount of shear that is definite.

In light of the considerations above, Applicants submit that the requirements of 35 USC §112, second paragraph, have been met and respectfully request that the present rejection of claims be withdrawn.

II. Rejection of Claims Under 35 USC §103

On pages 2-5 of the Office Action, all pending claims are rejected under 35 USC §103. On pages 3 and 4, claims 76-79 are rejected as being obvious over Joachimi, *et al.* (US 2003/0130381), in light of Kondo (US 5,830,568). The Examiner alleges that Joachimi discloses a method for producing laser weldable, transparent material by combining polymers and IR-absorbing compounds. Although the reference does not mention metal oxide particles of 1-500 nm, this is allegedly disclosed in Kondo and, according to the Examiner, one would have an incentive to combine these references since both are concerned with transparent materials that are IR absorptive.

On pages 4-5 of the Office Action, claims 61-75 and 80 are rejected based on Joachimi and Kondo in combination with Wissman (US 2005/0030384). The Joachimi and Kondo references are cited for the reasons discussed above. The Wissman reference is cited as teaching a method for laser welding materials of the type disclosed in Joachimi.

Applicants respectfully traverse these rejections. Arguments in favor of patentability are presented below and are intended to apply equally to all claims rejected on obviousness grounds.

Applicants' Claimed Invention

The present invention involves the laser welding, or making, of a plastic material that is highly transparent to visible light and that has a high enough concentration of metal oxides or doped metal oxides to make it laser weldable. This is apparent from comparative examples A and B, Examples 1-3 (pages 14-18) and from the paragraph spanning pages 5 and 6. In order to maintain transparency, the metal oxides used in Applicants' compositions must: a) have a particle size of 1 to 500 nm; and b) be present at a concentration of 0.0001 to 0.01 weight-percent of the plastic material. These two parameters, particle size and concentration, are not independent of one another but, instead, are constrained by the requirement that material be transparent. This can be seen from page 7 of the application, second full paragraph, which reads:

If the particle size and concentration are selected suitably in the range specified, even with high-transparency matrix materials, impairment of the intrinsic transparency is prevented. It is thus expedient to select the lower concentration range for metal oxides having particle sizes above 100 nm, while higher concentrations may also be selected for particle sizes below 100 nm.

Thus, when larger particles, above 100 nm, are used, concentrations at the lower end of the permitted range (1-500 nm) are likely to be needed to maintain transparency whereas higher concentrations are likely to be possible when using smaller particles (below 100 nm). Of course, these parameters may also be affected by the particular metal oxide or combination of metal oxides chosen.

Arguments

The characteristics of Applicants' claimed invention described above are not suggested by the cited references either individually or when considered in combination. Although Joachimi discloses thermoplastic moldings, it uses light absorbing agents that are entirely different from the ones recited in Applicants' claims (see, *e.g.*, paragraph [0103]). The concentrations disclosed by this reference are only relevant with respect to the particular light absorbing agents described therein. These concentrations say nothing about what would be appropriate for the metal oxides of Applicants' claims or for the ultrafine particles of the Kondo reference.

Kondo is not concerned with laser weldable materials at all. Instead, it describes laminated glass that can be used in automobiles and architecturally and which includes a film sandwiched between two sheets of glass. The film contains ultrafine particles (up to 2 μm in diameter) but the function of these particles, providing insulation, maintaining the transmission of radio waves, etc., appears to be unrelated to laser welding or to the maintaining of desirable visual characteristics in plastic materials that are exposed to laser light and partially melted as a result of such exposure. Thus, unlike Applicants' compositions, Kondo does not require that the concentration of particles and diameter of particles be adjusted so that the film layer is laser weldable and, at the same time, transparent to visible light. In fact, it is not clear how this adjustment would be possible from the information provided by Kondo.

This problem persists even if the Kondo reference is combined with the reference by Joachimi. The concentration range of particles that are taught in Kondo, 0.01-10% (see col. 3, lines 19-56), is almost entirely outside the range of what, based upon Applicant's application, would be appropriate for a laser weldable plastic. Moreover, the experimentation needed to arrive at Applicants' claimed range of 0.0001 to 0.01 weight-percent would appear to be much greater than what is normally needed for optimizing a process. As discussed above, the range is based upon a balancing of the type of laser-absorbing particle used, the diameter of the particles chosen and the need to maintain high transparency and low haze. Therefore, in the absence of more specific guidance concerning concentration, Applicants submit that the combination of Joachimi and Kondo does not render the claimed invention obvious. This is not changed by adding the Wissman reference since Wissman does not appear to disclose the use of laser absorbing nanoparticles at all.

Apart from the problems with concentration discussed above, it is not apparent why one of skill in the art would combine Joachimi and Kondo at all. There is no clear relationship between the production of laminated glass and the production of laser weldable plastic compositions. The Examiner appears to rely upon both references describing compositions that have agents that absorb IR radiation as a basis for combination. However, there is no indication that agents in the references are structurally similar or that they are used to achieve similar objectives.

The Examiner also suggests that both Kondo and Joachimi are concerned with compositions that are transparent, presumably to wavelengths in the visible range. While this is true for the Kondo reference, Joachimi is primarily concerned with natural-colored and pigmented laser-absorbing molding compositions. Applicants cannot see any incentive for using the ultrafine particles of Kondo in these compositions. To the extent that visually transparent compositions are disclosed in Joachimi, there is no indication of a need for different, or improved, laser absorbing agents.

For the reasons provided above, Applicants respectfully submit that the requirements of 35 USC §103 have been met for the claims now pending, *i.e.*, claims 61-80, and respectfully request that the rejection of these claims on obviousness grounds be withdrawn.

III. Double Patenting Rejections

On pages 6-7 of the Office Action, all claims are provisionally rejected on non-statutory double patenting grounds based upon application 10/544,041 (now on appeal). Since this is a provisional double patenting rejection, Applicants would like to defer consideration until such time as the claims are otherwise allowable. Further prosecution in the relevant cases could potentially obviate the rejection.

Conclusion

In light of the considerations above, Applicants respectfully request that the Examiner reconsider and withdraw the rejections that have been made. If, in the opinion of the Examiner, a phone call may help to expedite the prosecution of this application, the Examiner is invited to call Applicants' undersigned attorney at (240)683-6165.

Respectfully submitted,

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